



# *TECHNICAL UNIVERSITY OF MOMBASA*

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*Faculty of Engineering and Technology*

*Department of Electrical and Electronic engineering*

**UNIVERSITY EXAMINATION:**  
*Diploma in Electrical Power Engineering (DEPE 5)*  
**ELECTRICAL POWER SYSTEMS II**  
**EEP 2302**

**END OF SEMESTER EXAMINATION**

**SERIES: MAY 2016**

**TIME: 2 HOURS**

**Instructions to Candidates**

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of **five** Questions;. Attempt any **THREE** Questions.

**Do not write on the question paper.**

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### **Question ONE**

- (a). Explain why AC is preferred to DC for transmission and distribution. 2marks
- (b). Discuss the relative merits and demerits of underground and overhead systems. 6marks
- (c). Explain the following systems of distribution connection schemes :  
(i) Radial system  
(ii) Ring main system  
(iii) Interconnected system 6marks
- (d). Discuss briefly the design considerations in distribution systems. 6marks

### **Question TWO**

- (a) Explain why it is common practice to earth the neutral point of a power system (4 marks)
- (b) State the relative merits of ;  
(i) Solid earthing  
(ii) Resistance earthing  
(iii) Reactance earthing (6 marks)
- (c) (i) Explain the Petersen coil methods of neutral grounding and state its advantage.  
(ii) A 33KV three phase overhead line has each of its conductors having a capacitance to earth of 0.4 microfarad. Neglecting the power loss in the coil Determine the inductance and KVA rating of a correctly tuned arc suppression coil (Petersen coil) (10 marks)

### **Question THREE**

- (a) Explain the following with reference to underground cables: .  
(i) Void formation  
(ii) How voids lead to insulation breakdown  
(iii) How void formation can be prevented (11 marks)
- (b) With the aid of a labeled diagram for a single core cable derive the expression for:  
(i) Capacitance  
(ii) Maximum and minimum dielectric stress (9 marks)

#### **Question FOUR**

(a) State

- (i) The possible faults on overhead lines.
- (ii) Why circuit breaker rating is based on symmetrical short-circuit currents ?
- (iii) The reason for use of reactors in the power system ?
- (iv) Explain the various methods of connecting short-circuit current limiting reactors in the power system.

(10 marks)

- (b) A 3-phase, 30 MVA, 33 kV alternator has internal reactance of 4% and negligible resistance. Find the external reactance per phase to be connected in series with the alternator so that steady current on short circuit does not exceed 10 times the full load current.

(10 marks)

#### **Question FIVE**

(a) State in reference to power stations;

- (i) three reasons for voltage control
- (ii) four methods of voltage control

(7 marks)

(b) Explain the use of a synchronous condenser to control transmission line voltage.

(8 marks)

(c) State ;

- (i) The main location of voltage control equipment in a power station
- (ii) Two disadvantages of on load tap changing

(5 marks)